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(71) Applicant(s)  
**Amtech Europe Limited**  
Mercers Row, CAMBRIDGE, CB5 8EX,  
United Kingdom

(72) Inventor(s)  
**Kevin O'Farrell**

(74) Agent and/or Address for Service  
**Williams, Powell & Associates**  
4 St Paul's Churchyard, LONDON, EC4M 8AY,  
United Kingdom

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N649 N656 N658 N66Y N660 N661 N695 N728 N73X  
N782 N787  
U1S S2271**

(56) Documents Cited  
**GB 1018841 A US 3870582 A**

(58) Field of Search  
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INT CL<sup>6</sup> **B30B 15/06 , B32B 31/20**  
**ONLINE:WPI,CLAIMS**

## (54) Laminating articles

(57) A laminated article is manufactured by exerting pressure on an arrangement of plates 10 sandwiching the layers 12 to be laminated together, a relatively stiff plate member 18 is provided directly adjacent to said layers, said plate member being provided with one or more ridges and/or grooves (31, 32) on a major surface which faces said layers.

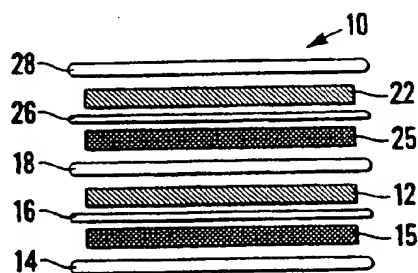


Fig. 1

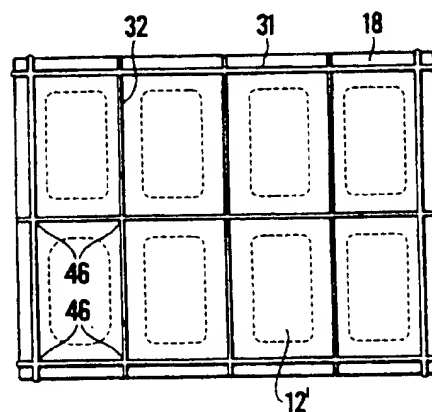


Fig. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

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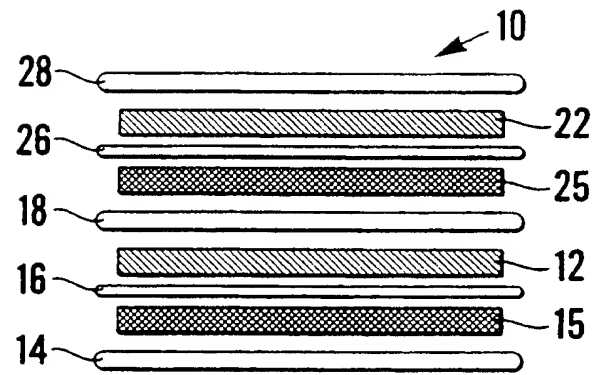


Fig. 1

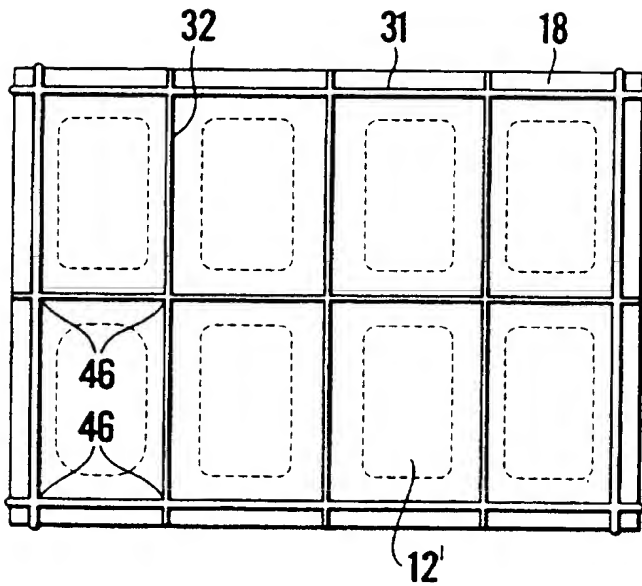


Fig. 2

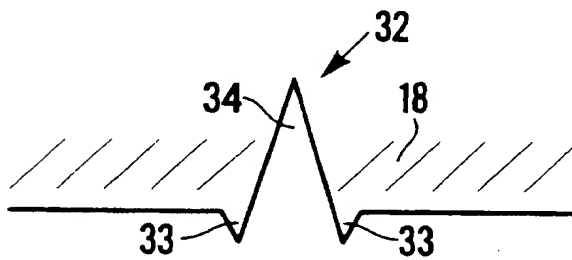


Fig. 3a

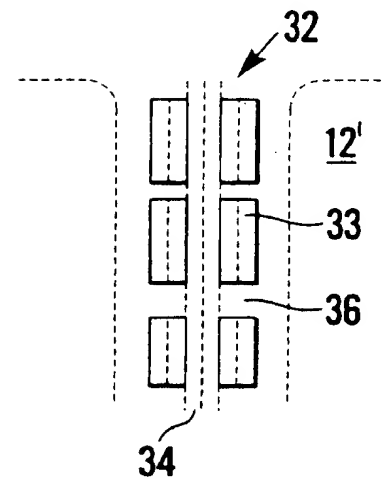


Fig. 3b

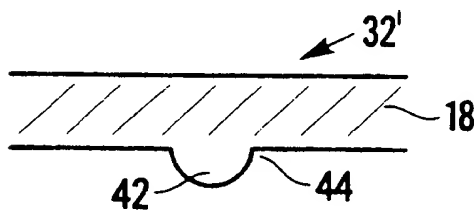


Fig. 3c

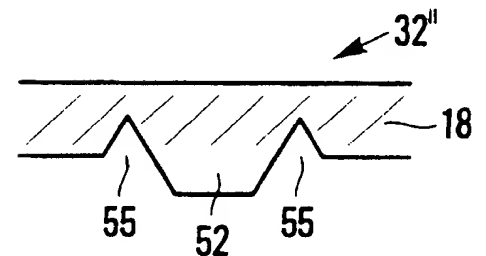


Fig. 3d

### Laminating Articles

The present invention relates to a method of laminating articles, for example credit cards or transponder tags incorporated in a product of substantially the same size and shape as a credit card.

When manufacturing such articles, the layers should preferably be completely flat. For example there is a requirement to manufacture credit cards sufficiently flat to be compatible with dye sublimation printers or similar printers. This is particularly useful where the card is to bear a photograph of the holder. It is particularly important to exclude the air from between the card and the laminating plates during the process. The most common way of achieving this at the moment is to use high pressure while the plastics material is cold. This is particularly troublesome where electronics components are included in the assembly, where the high pressure is likely to cause damage.

The present invention seeks to provide a method which permits a reduction in the pressure required during this part of the process.

According to a first aspect of the present invention there is provided a method of manufacturing a laminated article comprising exerting pressure on an arrangement of plates sandwiching the layers to be laminated together, wherein a relatively stiff plate member is provided directly adjacent to said layers, said plate member being provided with one or more ridges and/or grooves on its major surface which faces said layers.

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, of which:

Fig.1 is an exploded cross-section of a laminating arrangement, including pressure plates and the layers to be laminated;

Fig.2 is a bottom plan view of a pressure plate, indicating the location of eight laminated articles before separation;

Fig.3a is an enlarged sectional view of a surface of a pressure plate;

Fig.3b is an enlarged bottom plan view of the surface of the pressure plate of Fig.3a; and

Figs 3c and 3d are enlarged sectional views of the surfaces of modified pressure

plates.

Referring to the drawings, Fig.1 shows a laminating arrangement 10 for producing a laminated article from a plurality of plastics layers indicated generally at 12. The layers 12 incorporate any desired electronic component or circuit (not shown). The arrangement comprises a firm base plate 14, a resilient layer 15 e.g. of silicon rubber, a thin flexible metal plate 16 with a matt finish and, on the other side of layers 12, a metal plate 18 which is substantially thicker than plate 16. Plate 18 is not flexible and has a glossy finish in order to give best results with printers.

Further similar sets of plates 26,28 and a layer 25 may be provided for simultaneously laminating additional plastics layers 22.

Figure 2 is a bottom plan view of plate 18. It will be noted that the laminating stack is arranged to laminate a relatively large area which is subsequently separated into eight articles, indicated by dotted outlines 12'. The bottom surface of plate 18 is formed with peripheral ridged bands 31 and further ridged bands 32. From the enlarged view of Fig.3c, it will be noted that each ridged band comprises two ridge members 33 separated by a channel 34. Fig.3b shows a bottom plan view showing a detailed view of ridge members 33 with gaps 36 therebetween.

To manufacture a laminated article, heat and a relatively gentle pressure are applied over the whole stack. Considering the area of layers 12 lying within a rectangle of four ridged bands 32 (Fig.2), the plastics material is initially held by the bands slightly spaced from the rest of the lower surface of metal plate 18. As the pressure is increased the thin plate 16 backed by the rubber 15 flexes slightly. This causes initial contact between the layers 12 and plate 18 to occur adjacent to the centre of the rectangle. As the pressure is increased further, the contact area between layers 12 and plate 18 increases out towards the edges. As it does this, air is pushed outwardly from the centre and thus away from the area required for printing. Channels 34 and gaps 36 serve to allow the air to escape and thus to allow a completely flat laminated product to be produced.

Pressure and heat are then removed and the laminated articles, e.g. credit cards or transponder tags, are obtained by cutting along lines 12'.

An advantage of the above arrangement is that air is pushed from the centre of

the layers to be laminated outwardly to the periphery thereof. In the unlikely event of the air causing defects, these will occur in an area of the laminate which will be subsequently discarded. A further advantage is that escape paths are provided for the air, namely the gaps in the ridges and the interconnecting channels between the ridges which immediately convey escaping air outside the stack to avoid any air build-up which might cause problems.

Numerous modifications may be made to the above-described arrangement. For example, ridged bands 31 and 32 may be of identical cross-section. Preferably, however, peripheral ridged bands 31 are of greater cross-section and/or comprise more ridges 33 than bands 32. An advantage of making the ridges 33 of bands 31 larger or more numerous is that this reduces or prevents the tendency of the plastics material to flow towards the edges.

The ridges 33 may have flattened or rounded peaks, and channels 34, too, may have flat sides or be rounded. If desired, the channels 34 may be omitted, since an air escape channel will be formed underneath the raised part of the layers 12.

Fig.3c, for example, shows a ridged band 32' comprising a single ridge 42 which is used to raise the plastic layers 12 clear of plate 18. This produces an air escape channel at 44 by virtue of the sharp junction where the ridge joins the flat plate. With this arrangement, no ridges 42 are applied adjacent the corners 46 (Fig.2), to reduce the tendency for air to be entrapped at these junctions.

Fig.3d shows a flattened ridge 52 with an air escape arrangement which has been enhanced by the provision of the channels or grooves 55.

The introduction of heat can be delayed until any convenient step of the laminating process. If desired plate 16 may have ridges instead of, or in addition to, plate 18.

## CLAIMS

1. A method of manufacturing laminated articles comprising exerting pressure on an arrangement of plates sandwiching layers to be laminated together, wherein a relatively stiff plate member is provided directly adjacent to said layers, said plate member being provided with one or more ridges and/or grooves on a major surface which faces said layers.
2. A method according to Claim 1 wherein the ridges and/or grooves define one or more areas for laminating separate surfaces.
3. A method according to Claim 1 or 2, wherein the or each area is defined by the arrangement of elongate ridges.
4. A method according to Claim 3, wherein grooves are formed along at least one side of each of the ridges.
5. A method according to Claim 4 wherein at least the grooves are discontinued at regions in the proximity of the ridge intercepts.
6. A method according to Claim 1 or 2, wherein the or each area is defined by substantially parallel ridge members with a groove formed therebetween.
7. A method according to any proceeding Claim, wherein the ridges and/or grooves are intermittent.
8. A method according to any of the Claims 2 to 7, wherein the surfaces defined in respect of each article are substantially greater than the surfaces of the articles to be laminated.

9. A method according to any proceeding Claim wherein the arrangement of plates comprises of relatively flexible plate provided adjacent layers to be laminated opposite the relatively stiff plate.
10. A method according to Claim 9, wherein a resilient layer is provided adjacent the relatively flexible plate.
11. A method according to any proceeding Claim, wherein a plurality of each type of layer is provided in a stack operable to laminate articles in separate layers simultaneously.
12. A method of manufacturing a laminated article substantially as herein described with reference to the accompanying drawings.
13. A laminated article made by a method according to any preceding claim.



Application No: GB 9622192.4  
Claims searched: 1 to 13

Examiner: R.J.MIRAMS  
Date of search: 21 January 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.P): B5N

Int CI (Ed.6): B30B 15/06. B32B 31/20.

Other: ONLINE: WPI, CLAIMS

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB1018841A ✓ (ICI) whole document	at least 1, 2, 3 and 6
A	US3870582A ✓ (Brackett)	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.